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EXAMINER	
SAID, MANSOUR M	
ART UNIT	**PAPER NUMBER**
2673	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,934	SULLIVAN ET AL.	
	Examiner	Art Unit	
	MANSOUR M SAID	2673	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "**shutter**", "**heater**" and "**computer**" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 32 recites the limitation "the ultraviolet" in lines3-4; " the near-infrared" in lines 4; and "the infrared spectrum" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 3-10 are rejected under 35 U.S.C. 102(e) as being anticipate by Hatano (6,549,185 B1).

As to claim 1, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59) comprising first and second substrates (glass plates, (figure 1, (1)) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between the first and second substrates (glass plates, (figure 1, (1)) the material ((conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising a chiral liquid crystal (chiral nematic liquid crystal, ((figure 1, (3a)) & (column 5, lines 53-55)) and a voltage source (driver circuit, (figure 1, (B)) coupled to the material ((conductive films, (figure 1, (2)); & (column 5, lines 55-59)) and operative to provide a first electric field (first voltage pulse) across the material to form a first transparent state (transmmissive state) (abstract), a second electric field (second voltage pulse) across the material to form a second transparent state (transmmissive state) (abstract, column 2, lines 42-60; column 2, line 66 though column 3, line2 and column 6, lines 20-29), **only** one of the first and second electric fields (first & second voltage pulse) being present across the material (conductive films, (figure 1, (2)) at a given time (predetermine time) (abstract and column 6, lines 20-29), and a transition from one of the first and second electric fields (first & second voltage pulse) to the other of the first and second electric fields by decreasing the voltage magnitude of one of the

electric fields to zero volts (Vo) (figure 2B & 3A) ; abstract and column 6, lines 50-67), and then increasing the voltage magnitude of the other of the electric fields from zero volts (figure 2B & 3A) ; abstract and column 6, lines 50-67), the decreasing of voltage magnitude causing the material to form a transient light scattering state ((figure 2B & 3A) ; abstract and column 6, lines 50-67)).

As to claim 3, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (figures 2-4; abstract; and column 6, lines 50-67).

As to claim 4, Hatano teaches wherein said first and second substrates (glass plates, (figure 1, (1)) are comprised of a material selected from the group consisting of glass and plastic (column 5, lines 50-59).

As to claim 5, Hatano teaches wherein the chiral liquid crystal is selected from the group consisting of cholesteric liquid crystal, nematic liquid crystal, and smectic chiral liquid crystal (column 4, lines 45-50 and column 5, line 60 through column 6, line 2).

As to claim 6, Hatano teaches wherein said liquid crystalline material comprises a nematic liquid crystal and a chiral dopant (column 4, lines 45-50 and column 5, lines 54-67).

As to claim 7, Hatano teaches wherein liquid crystalline material is substantially polymer free (column 7, lines 48-54).

As to claim 8, Hatano teaches wherein the chiral liquid crystal has a positive dielectric anisotropy (column 1, lines 22-23).

As to claim 9, Hatano teaches wherein the voltage source comprises a DC bipolar voltage source (column 4, lines 51-63).

As to claim 10, Hatano teaches wherein said second electric field (second voltage pulse) has a polarity opposite the first electric field (first voltage pulse) (column 5, lines 36-45).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Urabe et al. (4,639,722; hereinafter referred to as Urabe).

Hatano teach all claimed limitations in claim 2 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's system so as to control the temperature of LCD cell (column 4, lines 25-30).

8. Claims 11, 13-16, 20, 22-23, 25-31, 34 and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao (6,302,542 B1).

As to claim 11, Hatano teaches a plurality transient light scattering shutter (figure 1, (1-2)) and (column 5, lines 50-59) comprising first and second substrates (glass plates, (figure 1, (1)) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between the first and second substrates (glass plates, (figure 1, (1)) the material ((conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising a chiral liquid crystal (chiral nematic liquid crystal, ((figure 1, (3a)) & (column 5, lines 53-55)) and a voltage source (driver circuit, (figure 1, (B)) coupled to the material ((conductive films, (figure 1, (2)); & (column 5, lines 55-59)) and operative to provide a first electric field (first voltage pulse) across the material to form a first transparent state (transmmissive state) (abstract), a second electric field (second voltage pulse) across the material to form a second transparent state (transmmissive state) (abstract, column 2, lines 42-60; column 2, line 66 though column 3, line2 and column 6, lines 20-29), **only** one of the first and second electric fields (first & second voltage pulse) being present across the material (conductive films, (figure 1, (2)) at a given time (predetermine time) (abstract and column 6, lines 20-29), and a transition from one of the first and second electric fields (first & second voltage pulse) to the other of the first and second electric fields by decreasing the voltage magnitude of one of the electric fields to zero volts (Vo) and then increasing the voltage magnitude of the other of the electric fields from zero volts (figure 2B & 3A) ; abstract and column 6, lines 50-67), the decreasing of voltage magnitude causing the material to form a transient light scattering state ((figure 2B & 3A) ; abstract and column 6, lines 50-67)).

Hatano does not expressly disclose that multi surface optical with a 3-D projection image.

However, Tsao teaches multi surface optical with a 3-D projection image (figures 1, & 9-10; abstract; column 1, lines 11-22; column 3, lines 29-34 and column 5, lines 55-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having 3-D projector into Hatano's device so as to improve for displaying volumetric three-dimensional (3D) images (abstract).

As to claims 13 and 25, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (figures 2-4; abstract; and column 6, lines 50-67).

As to claim 14, Tsao teaches that a second image projector (optical-mechanical) coupled to receive the projected images from the first image projector (image projector, (figure 1, (15)) (abstract ; column 1, lines 13-22; column 1, lines 60-62 and column 5, lines 55-67); the second image projector ((optical-mechanical)) comprising optics to project the three-dimensional image at a location in space distant from the optical device (abstract; column 1, lines 13-23; column 2, lines 18-27), said projected three-dimensional image appearing to float in space (abstract; column 1, lines 13-22; column 1, lines 48-52 and column 10, lines 57-59).

As to claim 15, Hatano teaches a controller (drive circuit, (figure 8, (B)) that comprises a controller (drive circuit, (figure 8, (B')), generating operative to control the state of each the shutter (column 6, lines 20-29; column 8, lines 66-67 and column 9, lines 13), wherein one the shutter is in the transient light scattering state to receive and display the respective image (column 12, lines 10-15), while the other said shutters are in the transparent state to allow viewing of the respective image on the one shutter (column 12, lines 27).

Hatano does not expressly teach such **a** computer processor controller.

However, Tsao teaches computer processor controller (microprocessor) (column 6, lines 1-3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to have a relative image (column 6, lines 1-2).

As to claim 16, Hatano teaches wherein the controller is further operative to control the shutters during a plurality of cycles (column 6, lines 50-62), each the shutter being in the transient light scattering state during a cycle different than the other the shutters (column 7, lines 1-4).

As to claim 20, Hatano teaches wherein said second electric field (second voltage pulse) has a polarity opposite the first electric field (first voltage pulse) (column 5, lines 36-45).

As to claim 22, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the shutter (figure 1, (1-2)) comprising a liquid crystalline material (figure 1, (a)), the material comprising a chiral liquid crystal (figure 1, (3a)) (column 5, lines 50-61, the method comprising applying a first electric field (first voltage pulse) to the shutter (figure 1, (1-2)) to form a first transparent state (transmmissive state) (abstract); decreasing the first electric field (first voltage pulse) to zero (Vo) volts to form a transient light scattering state (figure 2B & 3A) ; abstract and column 6, lines 50-67); and applying a second electric field (second voltage pulse) to the shutter to form a second transparent state (column 5, lines 35-42 and column 6, lines 50-62).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

As to claim 23, Hatano teaches wherein said second electric field (second voltage pulse) has a polarity opposite the first electric field (first voltage pulse) (column 5, lines 36-45).

As to claim 26, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the method comprising: transforming the shutter (figure 1, (1-2)) into a first transparent state (transmmissive state) (abstract); transforming the shutter (figure 1, (1-2)) into a transient light scattering state (figure 6B), column 3, lines 25-31 and column 8, lines 1-21); and transforming said shutter into a second transparent state (figure 6B) and column 3, lines 25-31 and column 8, lines 1-21).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

As to claim 27, Hatano teaches a transmitting greater than about 85% (more than 65%) of incident visible spectrum light while in said first transparent state (column 6, lines 40-49).

As to claim 28, Hatano teaches transmitting less than about 1% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

As to claim 29, Hatano teaches a transmitting less than about 0.5% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

As to claim 30, Hatano teaches a transmitting less than about 0.1% (2% or less) of incident visible spectrum light while in said transient light scattering state (column 6, lines 40-49).

As to claim 31, Hatano teaches a transmitting greater than about 85% (more than 65%) of incident visible spectrum light while in the second transparent state (which is applied to all transparent state) (column 6, lines 40-49).

As to claim 34, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (figures 2-4; abstract; and column 6, lines 50-67).

As to claim 40, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59) comprising first and second substrates (glass plates, (figure 1, (1)) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between the first and second substrates (glass plates, (figure 1, (1)) the material (conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising applying zero (Vo) voltage to the first conducting layer (conductive film, (figure 1, (2)) (column 5, lines 49-54) and column 6, lines 50-55); applying the second (conducting layer (figure 1, (2)) (column 5, lines 49-54) a positive voltage operative to make the material transparent (column 6, lines 20-28 and column 6, lines 55); decreasing the

positive voltage at the second conducting layer (conducting layer (figure 1, (2)) to zero volts to cause the material to form a transient light scattering state (column 6, lines 50-59); holding the zero (Vo) volts at the second conducting layer (column 6, lines 50-59 and column 8, lines 1-9); and decreasing the voltage at the second conducting layer (conducting layer (figure 1, (2)) from zero (Vo) volts to a negative voltage operative to make the material transparent (figures 12A-12B and column 10, lines 43-60).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

As to claim 41, the holding comprises holding said zero volts at said second conducting layer for about two milliseconds (2msec) (figure 5A and column 9, lines 55-67).

As to claim 42, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the shutter (figure 1, (1-2)) comprising a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between first and second conducting layers (conductive films, (figure 1, (2)) (column 5, lines 49-54), the material comprising a chiral liquid crystal (chiral nematic liquid crystal, (figure 1, (3a)) and column 5, lines 50-60), the method comprising applying zero voltage Vo) to said first conducting layer (conductive film, (figure 1, (2)) (column 5, lines 49-54) and column 6, lines 50-55); applying to said second conducting layer a positive (conductive film, (figure 1, (2)) voltage operative to make said

material transparent (column 6, lines 20-28 and column 6, lines 55); increasing said zero voltage at said first conducting layer to a positive voltage substantially equal to the positive voltage at said second conducting layer to cause said material to form a transient light scattering state (column 5, lines 59 and column 6, lines 62); decreasing the positive voltage at the second conducting layer (conducting layer (figure 1, (2)) from zero (Vo) volts to a negative voltage operative to make the material transparent (figures 12A-12B and column 10, lines 43-60).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

As to claim 43, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the shutter (figure 1, (1-2)) comprising a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between first and second conducting layers (conductive films, (figure 1, (2)) (column 5, lines 49-54), the material comprising a chiral liquid crystal (chiral nematic liquid crystal, (figure 1, (3a)), the method comprising: applying zero voltage Vo) to said first conducting layer (conductive film, (figure 1, (2)) (column 5, lines 49-54) and column 6, lines 50-55; applying to said second conducting layer a positive (conductive film, (figure 1, (2)) voltage operative to make said material transparent (column 6, lines 20-28 and column 6, lines 55); decreasing the positive voltage at the second conducting layer (conducting layer (figure 1, (2)) to zero volts to cause the material to form a transient light

scattering state (column 6, lines 50-59); holding the zero (Vo) volts at the second conducting layer (column 6, lines 50-59 and column 8, lines 1-9); and increasing the voltage at the second conducting layer from zero volts to the positive voltage (column 5, lines 59 and column 6, lines 62);

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

As to claim 44, a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the apparatus comprising means for transforming said shutter into a first transparent state (figure 2B, shows a plurality of transmissive which is considered as transparent state column 3, lines 25-31 and column 6, lines 20-29); means for transforming said shutter into a transient light scattering state (figure 2B shows the transforming of a scattering state and column 3, lines 25-31 and column 6, lines 20-29); and means for transforming said shutter into a second transparent state (figure 2B shows a plurality of transmissive which is considered as transparent state , column 3, lines 25-31 and column 6, lines 20-29).

As to claim 45, Hatano teaches means to increase transition speed between at least one of said first and second transparent states and said scattering state (figures 2-4; abstract; and column 6, lines 50-67).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

9. Claims 12, 24 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao as applied to claims 11, 22 and 26 above, and further in view of Urabe et al. (4,639,722; hereinafter referred to as Urabe).

As to claim 12, Hatano and Tsao teach all claimed limitations in claim 12 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a heater (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

As to claims 24 and 33, Hatano and Tsao teach all claimed limitations in claim 12 except that heating the material of liquid crystal display to increase transition speed between the transparent states.

However, Urabe teaches that heating the material of liquid crystal display to increase transition speed (raise the temperature) between the transparent states (column 4, lines 26-40).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

10. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao as applied to claim 11 above, and further in view of McDowall et al. (6,535,241 B1; hereinafter referred as McDowall).

Hatano and Tsao disclose all claimed limitations in claim 17, but omit that a projector projects each image of said set of images at a rate of no less than about 35 Hz.

However, McDowall teaches a projector projects each image of said set of images at a rate of no less than about 35 Hz. (column 8, lines 39-43).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate McDowall's teaching into Hatano's modified system so as to modulate the light coming for the projector (column 8, line 41).

11. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao as applied to claim 11 above, and further in view of Suyama et al. (6,469,683; hereinafter referred to as Suyama).

As to claim 18, Hatano and Tsao teach all claimed limitations except that the shutters are equally spaced apart from each other.

However, Suyama teaches a shutters (figure 53, (202)) (column 35-67 and column 39, lines 3-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Suyama's teaching having shutters into Hatano's modified system so to obtain a three-dimensional image without any phantom image position (column 39, lines 6-7).

As to claim 19, Suyama teaches wherein the shutters (figure 59, (202 A) are logarithmically spaced apart from each other (column 41, lines 45-63).

12. Claims 21 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao and further in view of Urabe.

As to claim 21, Hatano teaches a plurality transient light scattering shutter (LCD having a transmissive state and a scattering state (figure 1 and column 3, lines 26-31) comprising first and second substrates (glass plates, (figure 1, (1)) a liquid crystalline material (chiral nematic liquid crystal, (figure 1, (3a)) disposed between the first and second substrates (glass plates, (figure 1, (1)) the material ((conductive films, (figure 1, (2)) (column 5, lines 49-54) comprising a chiral liquid crystal (chiral nematic liquid crystal, ((figure 1, (3a)) & (column 5, lines 53-55)) and a voltage source (driver circuit, (figure 1, (B)) coupled to the material ((conductive films, (figure 1, (2)); & (column 5, lines 55-59)) and operative to provide a first electric field (first voltage pulse) across the material to form a first transparent state (transmmissive state) (abstract), a second electric field (second voltage pulse) across the material to form a second transparent state (transmmissive state) (abstract, column 2, lines 42-60; column 2, line 66 though column 3, line2 and column 6, lines 20-29), **only** one of the first and second electric fields (first & second voltage pulse) being present across the material (conductive films, (figure 1, (2)) at a given time

(predetermine time) (abstract and column 6, lines 20-29), and a transition from one of the first and second electric fields (first & second voltage pulse) to the other of the first and second electric fields by decreasing the voltage magnitude of one of the electric fields to zero volts (Vo) and then increasing the voltage magnitude of the other of the electric fields from zero volts (figure 2B & 3A) ; abstract and column 6, lines 50-67), the decreasing of voltage magnitude causing the material to form a transient light scattering state ((figure 2B & 3A) ; abstract and column 6, lines 50-67)).

Hatano does not expressly disclose that multi surface optical with a 3-D projection image.

However, Tsao teaches multi surface optical with a 3-D projection image (figures 1, & 9-10; abstract; column 1, lines 11-22; column 3, lines 29-34 and column 5, lines 55-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having 3-D projector into Hatano's device so as to improve for displaying volumetric three-dimensional (3D) images (abstract).

Hatano and Tsao teach all claimed limitations in claim 12 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

As to claim 46, an apparatus comprising a liquid crystalline material (chiral nematic liquid crystal, ((figure 1, (3a)), the apparatus comprising means for transmitting greater than

about 85% (more than 65%) of incident visible spectrum light (column 6, lines 40-49); means for switching from a first transparent state to a transient light scattering state in less than about 1.56 msec (0-50 msec) (column 6, lines 40-49 and column 7, lines 1-4); means for transmitting less than about is 1% (2% or less) of incident visible spectrum light while in the transient light scattering state (column 6, lines 40-49); means for switching from the transient light scattering state to a second transparent state (plurality of transmissive state, (figure 2B)), considered as transparent state) in less than about 2.73 msec (0-50 msec) column 7, lines 1-4); and means for transmitting greater than about 85% (more than 65%) of incident visible spectrum light while in said second transparent state (plurality of transmissive state, (figure 2B)), considered as transparent state) (column 6, lines 40-49).

Hatano does not disclose that creating three-dimensional images using.

However, Tsao teaches that creating three-dimensional images using (abstract and column 1, lines 12-22)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having microcomputer into Hatano's device so as to improve motion smoothness of the image (column 1, lines 20-22).

Hatano and Tsao teach all claimed limitations in claim 12 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

13. Claims 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao as applied to claims 26 above, and further in view of Andersson et al. (6,130,731; hereinafter referred to as Andersson).

Hatano and Tsao teach all claimed limitations in claim 32 but omit that the scattering light spectrum selected from an ultraviolet and a near infrared.

However, Andersson teaches the scattering light spectrum selected from an ultraviolet and a near infrared (column 9, lines 49-53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Andersson's teaching into Hatano's modified system so as to increase the versatility of the display device.

14. Claims 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano in view of Tsao and further in view of Urabe.

As to claim 35, Hatano teaches a transient light scattering shutter (figure 1, (1-2)) and column 5, lines 50-59), the shutter (figure 1, (1-2)) comprising a liquid crystalline material (figure 1, (a)), the method comprising; transmitting greater than about 85% (more than 65%) of incident visible spectrum light (column 6, lines 40-49); switching from a first transparent state to a transient light scattering state (abstract; column 3, lines 28-31 and column 6, lines 20-29); transmitting less than about 1% (2% or less) of incident visible spectrum light while in the

transient light scattering state (column 6, lines 40-49); switching from said transient light scattering state to a second transparent state (column 6, lines 20-29); and transmitting greater than about 85% (more than 65%) of incident visible spectrum light while in said second transparent state (column 6, lines 40-63).

Hatano does not expressly disclose that a 3-D image.

However, Tsao teaches multi surface optical with a 3-D projection image (figures 1, & 9-10; abstract; column 1, lines 11-22; column 3, lines 29-34 and column 5, lines 55-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Tsao's having 3-D image into Hatano's device so as to improve for displaying volumetric three-dimensional (3D) images (abstract).

Hatano and Tsao teach all claimed limitations in claim 12 except that a header operative to heat the liquid crystalline material.

However, Urabe teaches that a header (heater, (figure 6, (17) operative to heat the liquid crystalline material (column 4, lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate Urabe's device having a heater into Hatano's modified system so as to control the temperature of LCD cell (column 4, lines 25-30).

As to claim 36, Urabe teaches wherein said heating comprises heating said material to about 65 degree C (column 4, lines 26-40).

As to claim 37, Hatano teaches that a surfactant operative to increase transition speed between at least one of the first and second transparent states and the scattering state (figures 2-4; abstract; and column 6, lines 50-67).

As to claim 38, Hatano teaches The method of claim 35 wherein said switching from a first transparent state comprises switching from a first transparent state to a transient light scattering state in about 0.34 msec (figure B and column 7, lines 1-4).

As to claim 39, Hatano teaches wherein said switching from said transient light scattering state comprises switching from said transient light scattering state to said second transparent state in about 0.45 msec (figure B and column 7, lines 1-4).

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rosenblatt et al. (5,602, 662) disclose a liquid crystal cell including chiral nematic liquid material with negative dielectric anisotropy.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Mansour M. Said** whose telephone number is **(703) 306-5411**.

The examiner can normally be reached on Monday through Thursday from 8:30 a.m. to 6:00 p.m. The examiner can also be reached on alternate Friday from 8:30 a.m. to 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Shalwala Bipin**, can be reached at **(703) 305-4938**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist)

17. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer service Office whose telephone number is (703) 306-0377.

March 16, 2004

Mansour M. Said

BIPIN SHALWALA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600